Light-Triggered Phase Separation of Pickering Emulsions Co-Emulsified by Amino-Functionalized SiO_2 and Spiropyran-Based Ionic Liquid Surfactants

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Table S1. Influence of the concentration of $[C_4SPDMEA]Br$ and SM-NH_2 particles in water on the stability of Pickering emulsions formed by $[C_4SPDMEA]Br$, SM-NH_2, toluene and water.

SPIL(mol/kg)	SM-NH_2 (wt%)									
	0	0.01	0.03	0.05	0.07	0.1	0.2	0.3	0.4	0.5
0		×	×	×	×	×	×	×	×	×
9×10^{-5}	×	×	×	×	×	×	×	×	×	×
1×10^{-4}	×	×	×	×	×	×	×	○	○	○
3×10^{-4}	×	×	×	×	×	○	○	○	○	○
5×10^{-4}	×	×	×	×	×	○	○	○	√	√
7×10^{-4}	×	×	×	×	○	○	○	○	√	√
9×10^{-4}	×	×	×	○	○	○	○	√	√	√

√, stable Pickering emulsion; ○, unstable Pickering emulsion, oil coalescence was observed; ×, no Pickering emulsion formation.

Table S2. Influence of the concentration of $[C_6SPDMEA]Br$ and SM-NH_2 particles in water on the stability of Pickering emulsions formed by $[C_6SPDMEA]Br$, SM-NH_2, toluene and water.

SPIL(mol/kg)	SM-NH_2 (wt%)									
	0	0.01	0.03	0.05	0.07	0.1	0.2	0.3	0.4	0.5
0		×	×	×	×	×	×	×	×	×
8×10^{-5}	×	×	×	×	×	×	×	×	×	○
9×10^{-5}	×	×	×	×	×	×	○	○	○	○
1×10^{-4}	×	×	×	×	○	○	○	○	○	√
4×10^{-4}	×	×	×	×	○	○	√	√	√	√
5×10^{-4}	×	×	×	○	○	√	√	√	√	√

√, stable Pickering emulsion; ○, unstable Pickering emulsion, oil coalescence was observed; ×, no Pickering emulsion formation.

Table S3. Influence of the concentration of $[C_8SPDMEA]Br$ and SM-NH_2 particles in water on the stability of Pickering emulsions formed by $[C_8SPDMEA]Br$, SM-NH_2, toluene and water.

SPIL(mol/kg)	SM-NH_2 (wt%)									
	0	0.01	0.03	0.05	0.07	0.1	0.2	0.3	0.4	0.5
0		×	×	×	×	×	×	×	×	×
9×10^{-6}	×	×	×	×	×	○	○	○	○	○
1×10^{-5}	×	×	×	×	×	○	○	○	√	√
3×10^{-5}	×	×	×	×	○	○	○	√	√	√
5×10^{-5}	×	×	×	○	○	○	√	√	√	√
7×10^{-5}	×	○	○	○	√	√	√	√	√	√
9×10^{-5}	×	○	○	√	√	√	√	√	√	√

√, stable Pickering emulsion; ○, unstable Pickering emulsion, oil coalescence was observed; ×, no Pickering emulsion formation.

Table S4. The Zeta potential and interfacial tension of [C_6SPDMEA]Br (1×10^{-4} mol/kg) and SM-NH_2 (0.5 wt%) at 25 °C

material	Zeta potential /mV	interfacial tension / mN/m
SPIL+H_2O	32	40.42
SM-NH_2+ H_2O	40	44.13
SM-NH_2+IL+ H_2O	25	43.05
SM-NH_2+IL+ H_2O after irradiation	43	42.28

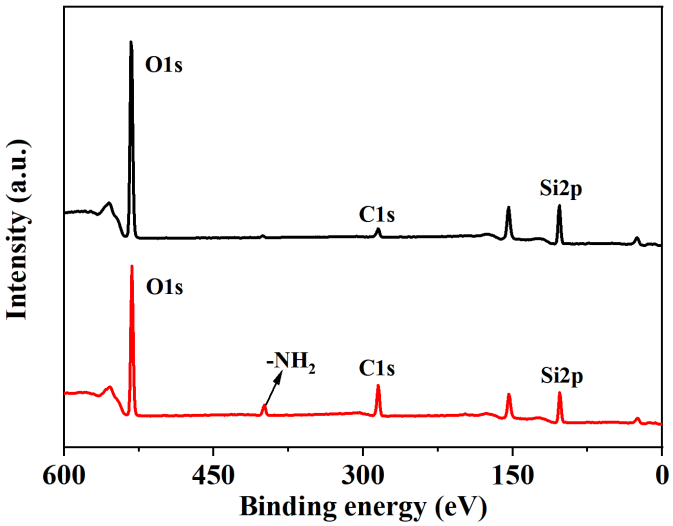

Figure S1. The XPS profiles of SiO_2 and SM-NH_2

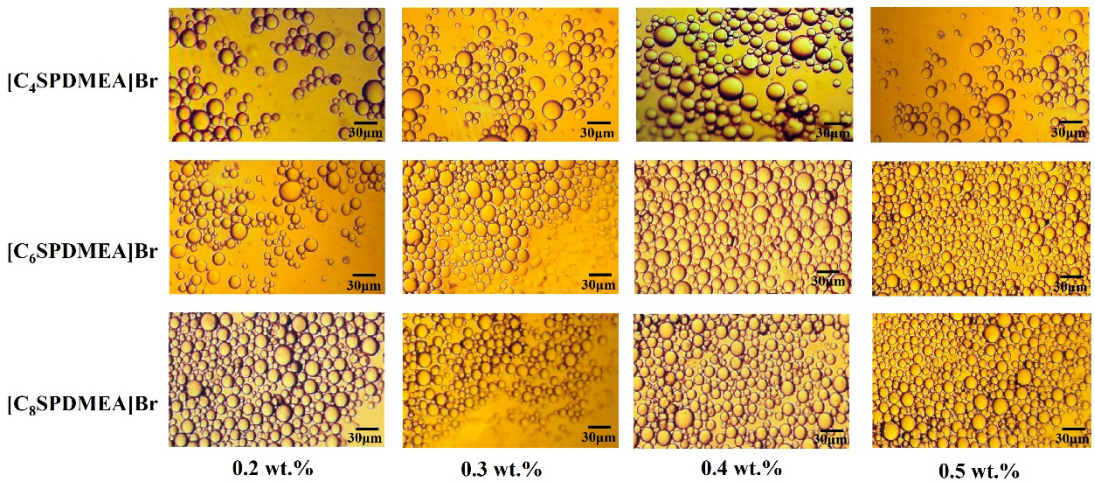

Figure S2. The optical microscopy photos of the Pickering emulsions: the concentration of the SPIL is 5×10^{-4} mol/kg, figures captured after fresh preparation.

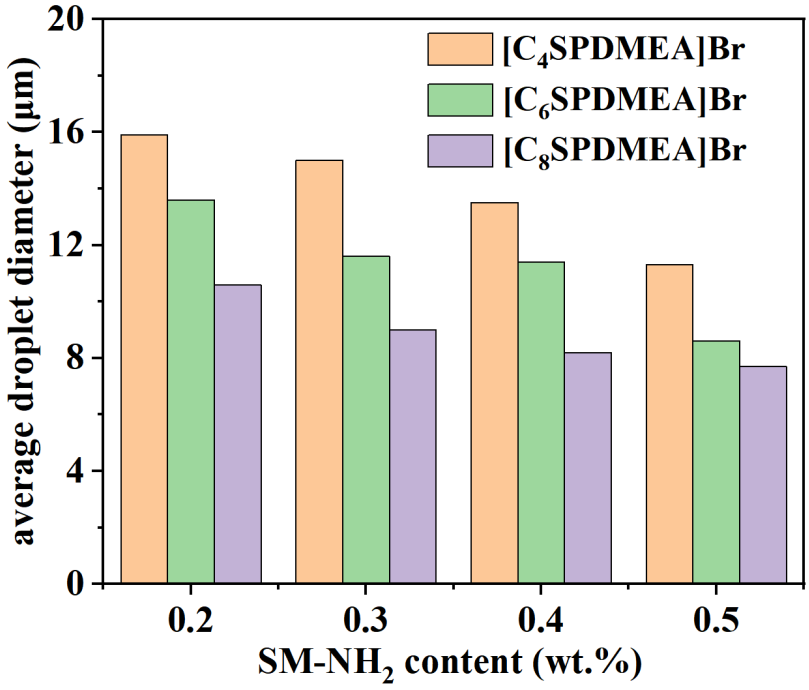

Figure S3. The average droplet diameter by optical microscopy for systems with 5×10^{-4} mol/kg SPIL and varying SM-NH_2 loadings

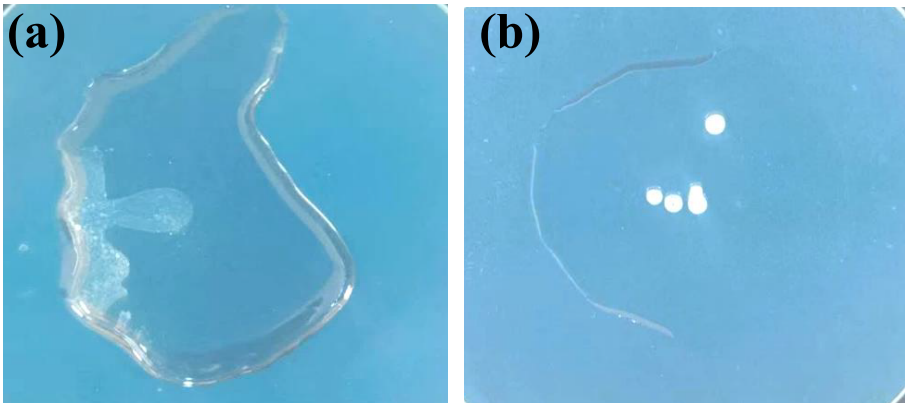

Figure S4. Photos [C_6SPDMEA]Br/SM-NH_2/toluene/water Pickering emulsion in water (a) and toluene (b)

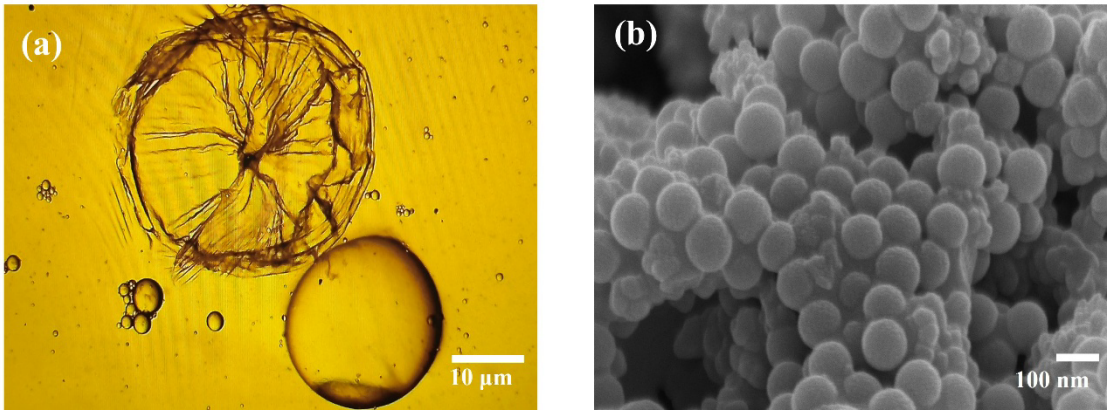

Figure S5. (a) Optical microscopy image of Pickering emulsion droplets after evaporation of water and toluene; (b) SEM image of the wrinkled structures from figure S2a.

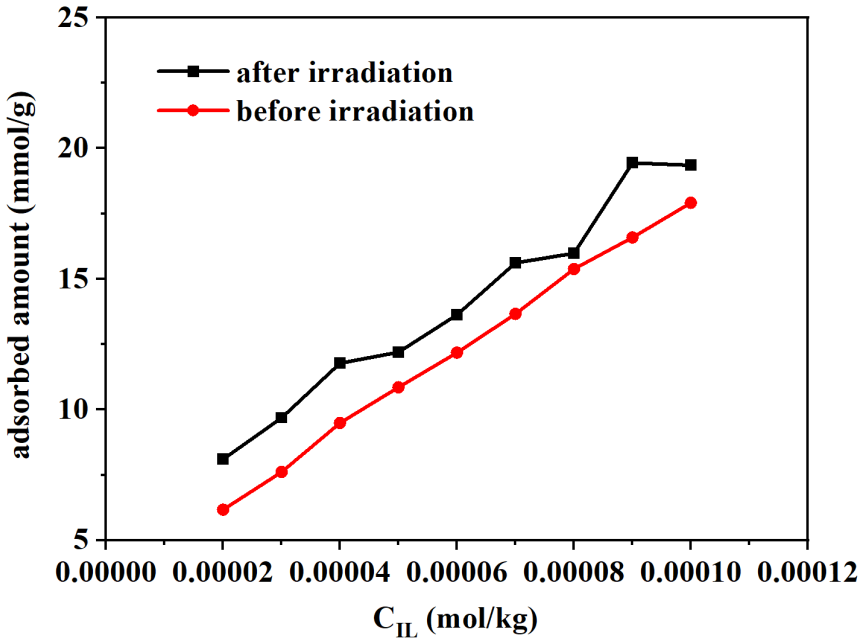

Figure S6. Adsorption capacity of $[C_6SPDMEA]Br$ on the surface of SM-NH_2 (0.5 wt%) before and after illumination at 25 °C: initial concentration of $[C_6SPDMEA]Br$, 1×10^{-4} mol/kg; content of SM-NH_2, 0.5 wt%

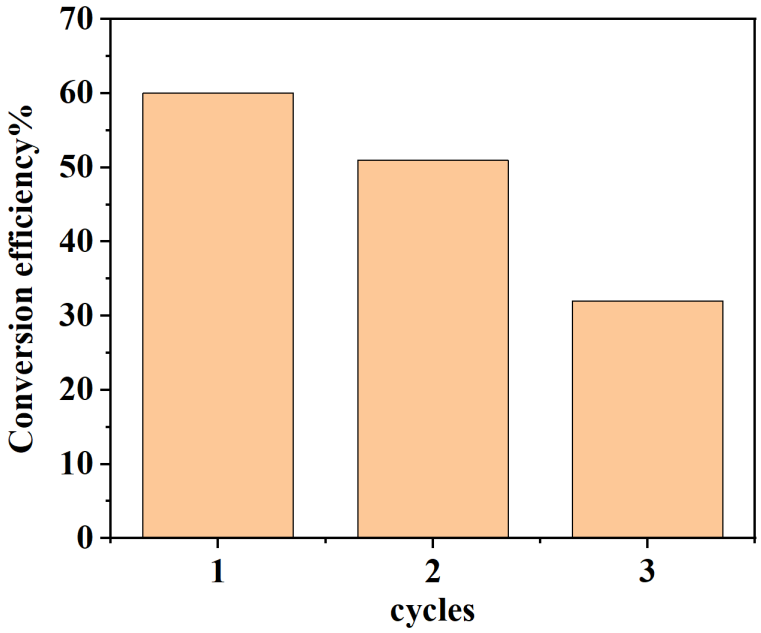

Figure S7. Conversion efficiency at different cycle numbers